P-48. Wearable Exoskeleton for Freezing of Gait in Advanced Parkinson's Disease: A Case Report

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Introduction

Freezing of gait (FOG) is a debilitating symptom of advanced Parkinson's disease (PD) that significantly impairs mobility and increases the risk of falls. Cerebrovascular events, such as thalamic infarctions, can further exacerbate gait dysfunction in PD patients. While pharmacologic treatments may offer partial relief, rehabilitation strategies, including assistive devices, play a crucial role in functional recovery. Wearable exoskeletons have emerged as a promising intervention for improving gait in neurological disorders. Here, we present a case demonstrating the use of a trunk-supported wearable exoskeleton in a patient with PD and a thalamic infarction to address persistent FOG.

Case Presentation

A 72-year-old woman with a nine-year history of idiopathic PD presented with worsening FOG over the preceding two months, requiring assistance from two caregivers to ambulate. The severe gait freezing episodes led to an emergency department visit. Brain imaging revealed a focal infarction in the right thalamus.

The patient was started on anticoagulant therapy with clopidogrel (75 mg once daily) and pitavastatin (2 mg once daily) in addition to her pre-existing antiparkinsonian regimen (perkin 25-250 mg, one tablet four times daily; perkin 25-100 mg, 0.5 tablet four times daily; and perkin CR 50-200 mg, one tablet at bedtime). While systemic muscle strength improved slightly, FOG persisted.

She was transferred to the rehabilitation medicine department, where a trunk-supported wearable exoskeleton was introduced for gait training (Figure 1). The training sessions lasted 30 minutes, five times per week, over a three-week period. External support was gradually reduced to encourage voluntary ambulation. Progressive improvements in gait and a reduction in freezing episodes were observed (Table 1).

Figure 1. The patient received gait training with a wearable exoskeleton

Table 1. The pre- and post-treatment outcome measurement

Measurement	Pre-Treatment	Post-Treatment
Mini-Mental State Examination (MMSE)	25	26
Geriatric Depression Scale (GDS)	3	2
Modified Barthel Index (MBI)	53	74
Berg Balance Scale (BBS)	35	43
Hoehn and Yahr (H&Y) Stage	4	3.5
Unified Parkinson's Disease Rating Scale (UPDRS)	58	38
Freezing of Gait Questionnaire (FOG-Q)	20	12

Conclusion

At the end of rehabilitation, the patient demonstrated improved gait stability and a significant reduction in FOG, allowing for discharge home. This case highlights the potential effectiveness of wearable exoskeletons in improving gait function in PD patients with cerebrovascular complications. Further studies are needed to determine the long-term benefits and optimal rehabilitation protocols for integrating exoskeleton-assisted therapy in PD management..